COMPARATIVE ANALYSIS OF HEALTH STATISTICS FOR SOUTHWEST ALBERTA COMMUNITIES

Alberta Social Services
and Community Health

April, 1983

EXECUTIVE SUMMARY

This report reviews the conclusions of a number of studies pertaining to the alleged atmospheric pollution caused by sour gas plants in the Twin Butte area of southern Alberta and to the effects on health attributed by local residents to such pollution. These were:

1. The report of the Scientific Advisory Committee on Air Pollution (1964)
2. Results of the Alberta Environment monitoring program (1971 and thereafter)
3. Waterton Gas Plants Agricultural Environment Research Project (Shell Resources, 1972-1976)
4. Human Health Effects of Hydrogen Sulphide and Sulphur Dioxide (literature review, Greenhill, 1978)
5. Environmental Council of Alberta report (McCoy, 1980)
6. Report by Kananaskis Centre for Environmental Research (1980).

General mortality, perinatal mortality, cancer incidence, the incidence of congenital abnormalities and sudden infant deaths occuring over a varying number of years were examined for Twin Butte and eleven other communities in southern Alberta, namely: Bow Island, Milk River, Raymond, Taber, Cardston, Magrath, Fort MacLeod, Claresholm, Vulcan, High River, and Turner Valley.

Hospital morbidity statistics could not be produced and adequately analysed in time to be included in this report. Such an analysis is now underway and will be published by Alberta Social Services and Community Health as a separate report.

From the indices studied, no increased mortality could be demonstrated for Twin Butte when compared with the province as a whole and with the eleven other communities.

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HISTORICAL REVIEW[1]

In 1958, residents of the Twin Butte area began to register complaints of health problems and odours which they associated with the adjacent gas field. In 1962, a public meeting was held with residents, government officials, oil company representatives and other interested parties in attendance.

Subsequent to this meeting, the Minister of Health formed a Scientific Advisory Committee on Air Pollution to ascertain whether air pollution was occurring and, if so, where and how it could be alleviated. The two oil companies with gas plants in the area, Shell and British American (later Gulf Oil), took frequent samples and the Division of Sanitary Engineering, Department of Health, maintained a mobile laboratory throughout 1962 and again from January to May, 1963. Complaints were investigated by physicians (interviews with 13 families and five investigations of specific complaints) and veterinarians (review of previous research work, survey of current problems and 8 investigations of reported complaints). Field studies of possible adverse effects on vegetation were conducted, as well as investigations of specific complaints. Finally, the meteorology of the area was examined using available information, information collected on two field trips, and reviews of weather conditions at the time of specific complaints.

In March, 1964, the committee submitted the following conclusions:

1. The chief air pollutants which are or may be released to the atmosphere in this area are the sulfur gases and, of these, sulfur dioxide and hydrogen sulfide are the most significant.

2. The concentrations of these pollutants which have been measured are well below the levels where an adverse effect on persons, livestock or vegetation would occur.

3. Specific adverse effects have not been observed despite careful studies by persons professionally competent in medicine, veterinary science and plant pathology.

4. The overall observation program does not suggest that abnormal or unpredictable dispersion of the air pollutants is occurring in this particular area. In fact the initial dispersion is indicated to be quite normal in the area closest to the plants where the highest concentrations occur.

5. The continued complaints and reports of complaint conditions (sic) are recognized and the Committee concludes that these are influenced by:

   a. A fear or anxiety that toxic or lethal concentrations of gases are occurring or may occur. The studies, and also the previous record of plant operations, show that this has not been the case and, due to planned emergency procedures at the plants, will not occur. Plant breakdowns are a possibility and require that the companies continue to be alert to this danger.

   b. The occasional occurrence of detectable odours arouses the feelings of fear and anxiety referred to above. Also, it is possible that when odours are noted, some persons will associate feelings of ill health and also abnormalities in the behaviour of livestock with the odours or general air pollution.

   c. Individual people vary in sensitivity to odours and particularly substances in air and food. Examples of the latter are many, varying from pollen in the air to individual items of diet. Recently, an extensive study in New York City of asthma outbreaks failed to find a positive correlation with air pollution measurements, but did find what appears to be positive correlation with weather conditions.

6. Continued intensive investigation on the scale carried out during the year 1963 is not warranted. Investigation of specific reports of adverse effects would be continued in co-operation with local doctors and veterinarians where there is reasonable evidence that the report requires further study. Monitoring of the air would be continued by the two oil companies on the same basis as in the past. The Division of Sanitary

Engineering would continue to monitor the air twice a year for a period of approximately one month each time, the same as for other plant areas in the province. Also vegetation analysis for sulphur content would be continued and compared with other areas. Further studies of the meteorology of the area would be undertaken if significant concentrations of pollutants are detected. Subsequent to the January 1964 meeting, the air monitoring program of the Division of Sanitary Engineering and the reports forwarded by the two oil companies have not indicated any significant change in the status of air pollution in this area.

In 1965, suits were launched against both Shell and British American Oil Co. by some area residents. An out of court settlement was made in 1971 after a lengthy pre-trial discovery process.

Alberta Environment was formed in 1971 and as part of their normal monitoring program, air quality monitoring was continued, and detailed air analyses were performed in response to any complaints received. However, air quality was found to meet the standards of the Clean Air Act.

Shell Canada Resources Ltd. hired a consultant firm to carry out a project (the Waterton Gas Plants Agricultural Environmental Research Project). Animal work (chickens, mice, hogs, cattle) and crop work (pots and plots) were examined. No significant results were obtained over the four year period, 1972-76.

In 1975, construction was begun on the Shell Claus Off-Gas Treatment (SCOT) plant, to comply with the 98.7% emission standard for sulphur removal.

A literature review by Dr. Stanley Greenhill (Faculty of Medicine, University of Alberta) was published in May 1978. It was titled "Human Health Effects of Hygrogen Sulphide and Sulphur Dioxide". The conclusions which emanated from this review were:

- Hydrogen sulphide (H_2S). Certain high risk groups show increased susceptibility to H_2S and include:

1. growing infants;
2. alcoholics;
3. individuals with eye and respiratory tract problems;
4. individuals with certain cardiac conditions;
5. individuals with neurological or psychiatric disorders; and
6. individuals with haemotological disorders.

- Sulphur Dioxide (SO_2). Susceptible individuals include:

1. the young;
2. the asthmatics; and
3. those with pulmonary dysfunction.

Alberta Environment released results of air quality monitoring carried out over the period March through May 1980. All levels, with the exceptions of hydrogen sulphide and ozone, were well below the Alberta Clean Air Regulations. For hydrogen sulphide, the maximum recorded concentration (0.17ppm) was far below levels at which effects on health have been documented. No effects on health have been documented at the recorded levels for ozone. Monitoring programs by both Shell and Gulf indicated that hydrogen sulphide concentrations exceeded limits of long-term exposure levels less than 1% of the time and ozone concentrations exceeded long-term exposure levels continuously, but these were not attributed to plant operations.

In October 1980, Dr. E.E. McCoy (Department of Paediatrics, University of Alberta) conducted a study on behalf of the Environmental Council of Alberta based on complaints of the families. He recommended further epidemiological studies, air sampling (to include winter months), correlation of toxicity with winter conditions and relation of the complaints to a control community. A selenium study conducted by the Kananaskis Centre for Environmental Research (University of Calgary) for Alberta Environment found no evidence to relate health problems to identified levels of selenium in the air and groundwater.

Throughout the months of January through March 1981, Alberta Environment surveyed the ambient air quality in the Pincher Creek area. Hydrogen sulphide and ozone exceeded limits on occasion through these winter months, but the

measured levels were still below the levels at which adverse effects on health have been documented.

In summary, there appeared to be no conclusive evidence relating gas plant emissions to the health problems identified by residents of the Twin Butte study area.

In late 1981, the Canadian Public Health Association developed a proposal which would attempt to resolve the concerns of the Twin Butte residents about effects on health associated with gas plant emissions. Alberta Social Services and Community Health decided not to accept this proposal. Instead, the Department accepted a proposal submitted by Dr. Earle Snider (Department of Sociology, University of Alberta) which involved a survey questionnaire and analysis of hair samples, since it more specifically addressed the health complaints being made by residents. An agreement was reached with Alberta Environment that any air-borne contaminants identified by Dr. Snider as possibly causing ill-health in the local residents would be monitored by that Department.

As a supplement to the report being prepared by Dr. Snider, Alberta Social Services and Community Health offered to review existing reports and to examine morbidity and mortality statistics in the Twin Butte study area. The results of this examination follow.

METHOD AND RESULTS

The variables chosen for inclusion in this study were: perintal mortality, sudden infant deaths, congenital anomalies, general mortality, and cancer incidence. Although morbidity comparisons were also considered, data proved difficult to obtain. Information on the ten most common diagnostic categories within each of the identified hospital districts is not routinely produced. Some morbidity information was available, but for the purposes of this study, no meaningful comparisons could be made. An analysis of hospital morbidity statistics is now being completed by Alberta Social Services and Community Health and the results will be published in a separate report. For these reasons, morbidity analyses are excluded from this report. Exceptions are, however, information pertaining to cancer incidence (supplied by the Cancer Registry) and congenital anomalies.

Where possible, the Twin Butte study area has been compared with eleven other communities in southern Alberta. These communities are Bow Island, Milk River, Raymond, Taber, Cardston, Magrath, Fort MacLeod, Claresholm, Vulcan, High River and Turner Valley. The selection criteria were geographic location, proximity to the study area, comparable population, and the presence or absence of sour gas plants. Comparisons were made across the years 1975-1981 where possible.

Before proceeding with the results of these comparisons, it should be noted that there are limitations attendant on small area comparisons. For example, because of the small geographic and population sizes, total deaths and illnesses will likewise be small. An illustration would be that an area overrepresented by seniors will probably have a higher crude mortality rate than an area underrepresented by seniors. Another limitation to this study is a change in the recording system for mortality data in 1978. The figures for 1975 to 1978 are based on one list and categorization of causes of death, while the figures for 1979 to 1981 are based on another. With this in mind, discussions of the remaining variables (sudden infant deaths, congenital anomalies, cancer incidence, and mortality) follow.

Analysis of Morbidity

Congenital Anomalies

Table 1 illustrates the occurrence of congenital anomalies in the province, Twin Butte, and the comparison communities. Information was available for a two-year period only (1980 and 1981). Information for 1982 is not yet complete. The results suggest no irregularities in the incidence of congenital anomalies in the study area and the eleven other communities over this two year period.

Incidence of Cancer in the Pincher Creek Area

Over the period from 1966-1980 there were 314 cases of cancer in Municipal District number 9 (Pincher Creek area). 158 were in females and 156 were in males. There were 26 sites identified in men and 29 sites identified in women. Unusual trends in cancer have not been observed in either males or females.

Cancer of the skin (36 cases), breast (30 cases), cervix in situ (15 cases), uterus (9 cases) and ovary or fallopian tubes (8 cases), were the sites of greatest incidence in females. In males, the skin (46 cases), prostate (32 cases), trachea, bronchus, lung (15 cases) and buccal cavity (10 cases), were the sites of greatest incidence.

Table 2 shows the crude cancer incidence rates in Municipal District 9, Census Area G3 (which contains Municipal Districts, 9, 6, and 26), and the province of Alberta over the period from 1961-1981. The populations for Area MD 9, Area G3, and Alberta are provided in Table 3.

Table 4 provides a more complete comparison of cancer rates in Census Area G3 (1961-1981), which includes the Pincher Creek and Twin Butte areas, with the rate per 100,000 age standardized to 1971 Alberta census population.

TABLE 1

CONGENITAL ANOMALIES

1980	Province	Taber	S.W. of Cardston	Twin Butte	Fort MacLeod	Raymond	High River
Cleft Lip	41						
Hypospadias	76						
Rectal Atresia	16		1		1		
Downs' Syndrome	35						
Limb Reduction	10						
Cleft Palate	24	1		1			
Anencephalus	17						
T.E. Fistula	2						
Hydrocephalus	27						
Spina Bifida	17						
TOTAL BIRTH DEFECTS	265	1	1	1	1		
TOTAL PEOPLE W/DEFECTS	253	1	1	1	1		

1981	Province	Taber	S.W. of Cardston	Twin Butte	Fort MacLeod	Raymond	High River
Cleft Lip	32						1
Hypospadias	65	1					1
Rectal Atresia	4						
Downs' Syndrome	29						
Limb Reduction	10						
Cleft Palate	27	2					
Anencephalus	12						
T.E. Fistula	7						
Hydrocephalus	23						
Spina Bifida	18	1				1	
TOTAL BIRTH DEFECTS	227	4				1	2
TOTAL PEOPLE W/DEFECTS	222	4				1	2

Source: Vital Statistics Registry.

TABLE 2

Crude Incidence Rates per 100,000 (No Skin, No CIS.)*

	Census Year	M.D.9	Area G3	Alberta
Male	1961	131.46	150.56	114.21
	1966	192.44	199.91	180.9
	1971	225	235.97	200.43
	1976	230.09	266.48	238.97
	1981	272.11	256.07	234.71
Female	1961	127.47	110.28	113.88
	1966	202.17	197.29	174.62
	1971	161.89	204.24	189.27
	1976	293.75	263.2	225.46
	1981	236.69	246.66	215.2

*Cervix In-Situ

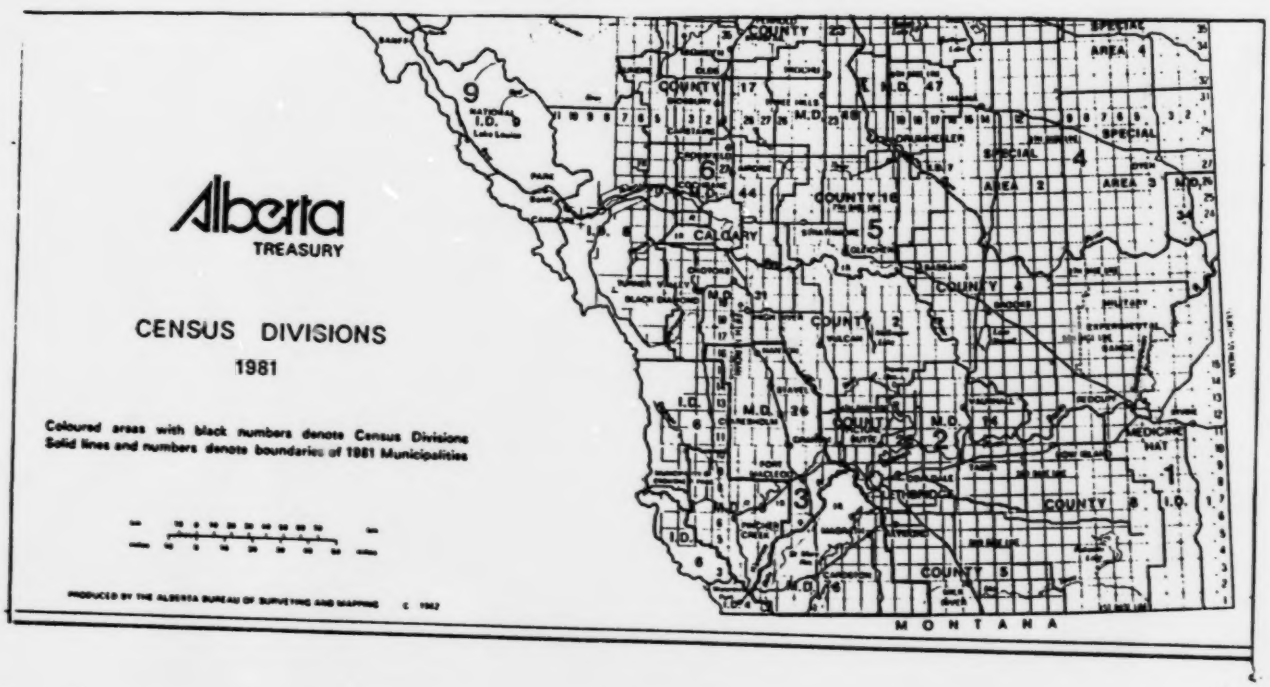

TABLE 3

Population for Area MD9

	Year	Age 0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+	Total
Male	1961	449	385	294	249	234	513	406	358	199	83	177	3347
	1966	368	363	364	281	168	318	354	331	244	74	149	3014
	1971	320	400	335	350	235	395	340	320	280	70	155	3200
	1976	320	330	400	335	275	485	345	345	285	105	165	3390
	1981	355	340	305	410	280	610	395	350	285	140	205	3675
Female	1961	477	338	314	245	208	417	338	265	156	66	157	2981
	1966	302	366	309	276	174	315	325	306	187	63	147	2770
	1971	285	335	360	280	210	410	320	310	235	65	155	2965
	1976	285	330	330	340	245	485	330	325	265	90	175	3200
	1981	305	285	325	320	285	550	385	325	275	120	205	3380

Population for Area 03

	Year	Age 0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+	Total
Male	1961	864	806	667	551	481	1011	909	795	682	229	444	7439
	1966	689	726	755	571	360	591	782	762	624	243	400	6503
	1971	595	775	730	730	510	810	735	735	660	260	410	6950
	1976	620	665	750	735	615	1060	725	770	660	215	465	7280
	1981	704	729	712	876	675	1280	837	845	721	268	554	8201
Female	1961	861	733	700	498	378	831	848	690	480	173	337	6529
	1966	573	706	659	577	335	597	761	711	523	184	355	5981
	1971	560	640	715	640	455	760	680	745	600	200	370	6365
	1976	595	635	685	710	560	970	675	770	625	230	460	6915
	1981	666	639	738	750	651	1116	786	843	694	282	538	7703

Population for Alberta

	Year	Age 0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65-69	70+	Total
Male	1961	90389	80219	65527	49464	43787	99410	86936	66694	47624	17018	33448	680516
	1966	87214	89781	79648	63788	49180	93426	93345	73416	52634	18174	35477	736083
	1971	75900	90360	92035	80975	69765	109675	100210	81450	59180	21675	37320	818545
	1976	76585	81620	93725	97440	93565	149405	105140	92565	66425	23720	41590	921780
	1981	89446	95300	109332	113853	109262	174609	122824	108079	77541	27698	48578	1076522
Female	1961	85903	75949	62502	47837	44116	91210	84366	60884	39261	14454	27492	633974
	1966	82571	86167	75210	63128	51354	91116	89683	70794	47506	16722	32884	707135
	1971	72500	87030	87320	77900	70955	107180	91720	80415	57195	20030	38915	791160
	1976	72845	77710	89845	92805	90515	142760	99015	89580	67755	24440	47360	894630
	1981	85069	90675	104898	108341	105744	166781	115675	104591	79106	28537	55312	1044729

University of Alberta

Table 4

Incidence of Cancer in Census Area G3 (including Pincher Creek)
1961 - 1981*

Cancer Site	Males	Females
Buccal cavity and pharynx	17.6 (15.6)	7.1 (4.1)
Stomach	15.0 (14.4)	7.6 (6.5)
Intestine	13.4 (16.9)	15.6 (20.1)
Rectum	15.9 (10.9)	9.2 (6.9)
Lung	26.1 (33.6)	3.7 (7.6)
Skin	76.8 (59.3)	66.4 (46.1)
Breast	-	65.9 (58.1)
Cervix	-	11.4 (12.0)
Other uterus	-	20.3 (13.6)
Ovary	-	13.2 (8.7)
Prostate	41.6 (38.3)	-
Bladder and Kidney	23.0 (22.8)	7.0 (7.7)
Leukemia	7.6 (9.4)	6.6 (4.9)
Other lymphatic	13.1 (13.0)	14.2 (8.5)
Other and N.S.	40.2 (38.8)	39.7 (26.5)
TOTAL	291.3 (274.0)	287.9 (231.3)

*Rates per 100,000 age-standardized to 1971 Alberta census population. Rates for Alberta in 1971 appear in brackets.

While cancer of the skin is higher in Municipal District number 9, this increased incidence is not limited to this area. It has already been established that cancer of the skin is higher in southern Alberta (Cancer Registration in Alberta, Provincial Cancer Hospitals Board). This is believed to be related to exposure to sunlight.

Analysis of Mortality

Perinatal Mortality

Ms. Rachael S. Tasker[1] reviewed perinatal deaths from 1966 to 1980 in the Pincher Creek (B) and two neighbouring hospitals (A and C). Her report reads as follows:

"The Improvement in recent years in the performance of these small hospitals has to take into consideration the probability of transfer of high-risk patients, especially premature labour, to be delivered in a Neonatal Intensive Care Unit (see graph). Also, there has been an increased resort to caesarean section to reduce labour deaths.

Malformations incompatible with life in these three hospitals have decreased from 7 in the first period to 5 in the second to 0 in the most recent five years. This latter is less than would be expected; the provincial incidence is 2.5 per thousand total births for this cause of death category. However, these are small numbers and the probability of this having occurred by chance must be borne in mind. Malformations are often not anticipated and therefore not transferred.

As mentioned above, prematures are usually transferred for delivery in a Neonatal Intensive Care Unit. However, some small fetuses may be dead when the patient arrives in hospital or she may be too far along in labour for transfer, so I have included a brief table on the 500 - 1000 gram fetuses. The downward trend is the same as for the larger perinatal deaths.

Perinatal mortality is not an easy measure of the specific type of environmental health in which you are interested. There are always so many other variables which interfere with any specific point upon which the study would like to focus (for example, in-breeding and alcoholism). The reason for the high rates in hospitals A and C is largely an ethnic problem of patients arriving for delivery with little or no prenatal care."[2] (See Appendix 1 for details of Ms. Tasker's review.)

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1 Ms. Tasker is the Executive Assistant, Research Associate, Perinatal Committee of the Alberta Medical Association.

2 Personal correspondence with Dr. J.D. Taylor, July 13, 1982.

Sudden Infant Deaths

The Vital Statistics Registry furnished the information for this part of the study. Over the seven year period 1975-1981, there were no sudden infant deaths in the Twin Butte area and the eleven comparison areas. The statistics for the province and Twin Butte appear in Table 5.

TABLE 5

INCIDENCE OF SUDDEN INFANT DEATHS

	1975	1976	1977	1978	1979	1980	1981
ALBERTA	66	71	69	82	90	78	71
TWIN BUTTE	0	0	0	0	0	0	0

General Mortality

Information for this section of the report was again obtained from the Vital Statistics Registry. This Registry identifies cause of death by sex, age, year, and community. Population figures for the twelve communities were taken from the 1976 Canada Census as age-specific population counts are not yet available for the 1981 census.

As shown in Table 6, the population for each of the twelve communities was analyzed by age category. For example, in Twin Butte, 18.5 percent (710 persons) of the population in 1976 was 0-9 years of age. Table 7 takes the percentage of the population in each age group in each community and indicates how similar on dissimilar this age distribution is from the provincial age distribution. The results of this analysis indicate the following:

1. The age distribution for Twin Butte is relatively similar to that of the provincial population. The rest of the communities differ considerably from the age structure of the province.

TABLE 6

tabl
cw=7

TWIN BUTTE STUDY

Table 1

1976 POPULATION: # AND % DISTRIBUTION BY AGE

	0-9		10-19		20-29		30-39		40-49		50-59		60-69		70+		
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
Bow Island	305	16.354	395	21.180	270	14.477	175	9.3834	195	10.456	210	11.260	180	9.6515	135	7.2386	1865
Milk River	160	15.023	220	20.657	135	12.676	105	9.8592	90	8.4507	140	13.146	100	9.3897	115	10.798	1065
Raymond	505	22.101	470	20.569	320	14.004	210	9.1904	160	7.0022	200	8.7527	190	8.3151	230	10.066	2285
Taber	1135	17.959	1365	21.598	975	15.427	665	10.522	605	9.5728	595	9.4146	530	8.3861	450	7.1203	6320
Cardston	675	19.509	695	20.087	520	15.029	280	8.0925	240	6.9364	315	9.1040	330	9.5376	405	11.705	3460
Magrath	245	18.491	275	20.755	195	14.717	125	9.4340	100	7.5472	130	9.8113	120	9.0566	135	10.189	1325
Twin Butte	710	18.538	790	20.627	635	16.580	465	12.141	380	9.9217	355	9.2689	270	7.0496	225	5.8747	3830
Fort MacLeod	500	16.234	635	20.617	455	14.773	325	10.552	290	9.4156	310	10.065	265	8.6039	300	9.7403	3080
Claresholm	570	14.786	600	15.564	615	15.953	335	8.6900	375	9.7276	470	12.192	470	12.192	420	10.895	3855
Vulcan	230	13.897	340	20.544	210	12.689	165	9.9698	175	10.574	200	12.085	150	9.0634	185	11.178	1655
High River	680	16.708	725	17.813	550	13.514	500	12.285	375	9.2138	335	8.2310	435	10.688	470	11.548	4070
Turner Valley	200	18.018	215	19.369	155	13.964	130	11.712	80	7.2072	110	9.9099	135	12.162	85	7.6577	1110
Alberta	154040	17.008	85900	20.526	172290	19.024	114750	12.670	94270	10.409	80865	8.9288	55925	6.1750	47625	5.2586	905665

TABLE 7

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TWIN BUTTE STUDY
Index of dissimilarity *

Age	Bow Island		Milk River		Raymond		Taber		Cardston	
0 - 9	16.35	0.65	15.02	1.99	22.10	-5.09	17.96	-0.95	19.51	-2.50
10 - 19	21.18	-0.65	20.66	-0.13	20.57	-0.04	21.60	-1.07	20.09	0.44
20 - 29	14.48	4.55	12.68	6.35	14.00	5.02	15.43	3.60	15.03	3.99
30 - 39	9.38	3.29	9.86	2.81	9.19	3.48	10.52	2.15	8.09	4.58
40 - 49	10.46	-0.05	8.45	1.96	7.00	3.41	9.57	0.84	6.94	3.47
50 - 59	11.26	-2.33	13.15	-4.22	8.75	0.18	9.41	-0.49	9.10	-0.18
60 - 69	9.65	-3.48	9.39	-3.21	8.32	-2.14	8.39	-2.21	9.54	-3.36
70+	7.24	-1.98	10.80	-5.54	10.07	-4.81	7.12	-1.86	11.71	-6.45
Index of diss.		8.49		13.10		12.08		6.58		12.48

Age	Magrath		Twin Butte		Fort MacLeod		Claresholm		Vulcan	
0 - 9	18.49	-1.48	18.54	-1.53	16.23	0.77	14.79	2.22	13.90	3.11
10 - 19	20.75	-0.23	20.63	-0.10	20.62	-0.09	15.56	4.96	20.54	-0.02
20 - 29	14.72	4.31	16.58	2.44	14.77	4.25	15.95	3.07	12.69	6.33
30 - 39	9.43	3.24	12.14	0.53	10.55	2.12	8.69	3.98	9.97	2.70
40 - 49	7.55	2.86	9.92	0.49	9.42	0.99	9.73	0.68	10.57	-0.17
50 - 59	9.81	-0.88	9.27	-0.34	10.06	-1.14	12.19	-3.26	12.08	-3.16
60 - 69	9.06	-2.88	7.05	-0.87	8.60	-2.43	12.19	-6.02	9.06	-2.89
70+	10.19	-4.93	5.87	-0.62	9.74	-4.48	10.89	-5.64	11.18	-5.92
Index of diss.		10.40		3.46		8.14		14.92		12.15

Age	High River		Turner Valley		Alberta
0 - 9	16.71	0.30	18.02	-1.01	17.01
10 - 19	17.81	2.71	19.37	1.16	20.53
20 - 29	13.51	5.51	13.96	5.06	19.02
30 - 39	12.29	0.39	11.71	0.96	12.67
40 - 49	9.21	1.20	7.21	3.20	10.41
50 - 59	8.23	0.70	9.91	-0.98	8.93
60 - 69	10.69	-4.51	12.16	-5.99	6.18
70+	11.55	-6.29	7.66	-2.40	5.26
Index of diss.		10.80		10.38	

*The index of dissimilarity is a measure of the difference between two age distributions based on the absolute differences between the percents at each age. In this procedure, the differences between the percents for corresponding age groups are determined, they are summed without regard to sign, and one-half of the sum is taken. The general formula is:

$$ID = 1/2 \sum_i \left| r_{2a} - r_{1a} \right|$$

2. For all the communities in this study, the proportion of older people (60+ years) is higher than the proportion of older people in the province as a whole. For the younger age groups (0-9 years, 10-19 years), the proportion is again higher than for the province.

3. As a result of the higher concentration of older and younger persons in the population of these communities, there were relatively smaller proportions of the middle age groups (20-29 years, 30-39 years, 40-49 years) than in the provincial distribution.

Table 8 examines age-specific death rates, crude death rates, and standardized death rates. All figures are based on 1,000. For example, in Twin Butte, for every 1,000 persons in the 0-9 year age group in the community, 1.8 deaths occurred. The numbers appearing in the column titled crude death rate are calculated by dividing the total number of deaths by the total population. The standardized death rate is the death rate controlled for age distribution. Tables 9, 10 and 11 provide the death rates for the three causes of death appearing most frequently on the death certificate (diabetes mellitus; pneumonia and influenza; bronchitis, emphysema and asthma) in the twelve communities.

An examination of these tables suggests that:

1. With the exception of Cardston, standardized death rates for all surrounding communities are higher than for the Twin Butte study area.

2. The range of standardized death rates over all communities is 4.05 to 8.82. Crude death rates are lowest for Twin Butte (4.95).

3. Age-specific death rates are consistent with the general pattern of mortality. In other words, death rate increases with the advancement of age.

4. Death rates for the three selected causes for all 12 communities show a pattern consistent with the one for total causes of death.

TABLE 8

tab2
cw=7

TWIN BUTTE STUDY

Table 2

Age-specific death rates, crude death rates, and standardized death rates

	Age-specific death rates									
	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70+	crude death rate	standardized death rate
Bow Island	1.87	1.08	2.12	0.00	4.40	5.44	18.25	83.60	9.57	7.41
Milk River	0.89	0.00	0.00	2.72	3.17	8.16	21.43	64.60	10.73	6.28
Raymond	2.26	0.61	1.34	3.40	4.46	11.43	20.30	58.39	9.82	7.00
Taber	1.76	0.73	1.03	2.36	5.19	7.68	17.52	64.13	8.14	6.63
Cardston	2.12	1.23	1.10	5.10	5.95	7.26	5.63	18.34	4.95	4.05
Magrath	5.25	0.52	1.47	1.14	2.86	3.30	23.81	61.38	10.35	6.71
Twin Butte	1.81	1.63	3.15	1.54	1.88	6.04	8.99	26.03	4.25	4.09
Fort MacLeod	3.14	1.80	1.88	3.52	1.48	9.22	21.56	91.43	13.13	8.82
Claresholm	1.50	1.43	0.46	0.43	3.81	5.78	19.45	71.77	11.86	6.58
Vulcan	3.11	0.00	0.00	0.00	4.08	9.29	22.86	88.80	13.81	7.86
High River	2.10	1.38	1.82	0.86	3.81	10.23	15.76	70.21	11.93	7.07
Turner Valley	1.43	0.00	1.84	1.10	7.14	9.09	15.87	52.10	7.98	6.01

TABLE 9

TWIN BUTTE STUDY

Table 6(a)

prt6diab
cw=7

Age-specific and standardized death rates from diabetes mellitus (cause 2) 1975-1981 calculated on basis of 1976 population

	Age-specific death rates									
	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70+	crude death rate	standardized death rate
Bow Island	0.00	0.00	0.00	0.00	0.73	2.04	7.14	16.93	2.22	1.59
Milk River	0.89	0.00	0.00	1.36	0.00	1.02	5.71	11.18	2.15	1.36
Raymond	0.00	0.30	0.00	0.68	0.00	3.57	8.27	10.56	2.19	1.53
Taber	0.00	0.10	0.00	0.64	1.18	3.60	5.12	13.33	1.92	1.56
Cardston	0.00	0.00	0.00	0.00	2.38	1.81	1.73	1.76	0.70	0.61
Magrath	0.00	0.00	0.73	0.00	1.43	1.10	2.38	11.64	1.73	1.15
Twin Butte	0.00	0.00	0.22	0.00	0.38	2.01	2.65	8.89	0.97	0.89
Fort MacLeod	0.00	0.00	0.31	1.32	0.00	2.30	3.77	9.05	1.62	1.14
Claresholm	0.00	0.00	0.00	0.00	0.38	3.34	6.08	13.61	2.67	1.43
Vulcan	0.62	0.00	0.00	0.00	0.82	2.14	7.62	11.58	2.42	1.46
High River	0.00	0.00	0.52	0.29	1.90	2.56	6.57	12.77	2.67	1.64
Turner Valley	0.00	0.00	0.00	1.10	1.79	3.90	3.17	13.45	2.06	1.58

TABLE 10

prt6pneu
cw=7

T W I N B U T T E S T U D Y

Table 6(b)

Age-specific and standardized death rates from pneumonia (cause 7) 1975-1981 calculated on basis of 1976 population

	Age-specific death rates									
	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70+	crude death rate	standardizec death rate
Bow Island	0.00	0.00	0.53	0.00	0.73	2.72	8.73	39.15	4.14	3.02
Milk River	0.00	0.00	0.00	0.00	3.17	7.14	10.00	42.24	6.71	3.81
Raymond	0.00	0.00	0.00	0.00	0.00	2.14	6.02	35.40	4.25	2.42
Taber	0.00	0.00	0.00	0.00	1.18	2.40	9.16	37.78	3.80	2.89
Cardston	0.21	0.00	0.00	0.00	0.00	2.72	1.30	13.76	2.02	1.08
Magrath	0.58	0.00	0.00	1.14	0.00	0.00	9.52	38.10	4.96	2.84
Twin Butte	0.00	0.00	0.22	0.00	0.00	1.21	4.23	12.06	1.16	1.05
Fort MacLeod	0.00	0.00	0.00	0.00	1.48	4.15	10.24	52.38	6.54	3.91
Claresholm	0.00	0.00	0.00	0.00	0.76	1.52	7.60	40.14	5.56	2.79
Vulcan	0.62	0.00	0.00	0.00	0.82	4.29	12.38	63.32	8.80	4.67
High River	0.00	0.00	0.00	0.29	0.38	4.69	5.58	41.34	5.83	3.01
Turner Valley	0.00	0.00	0.00	0.00	1.79	1.30	6.35	35.29	3.73	2.55

TABLE 11

prt6bron
cw=7

T W I N B U T T E S T U D Y

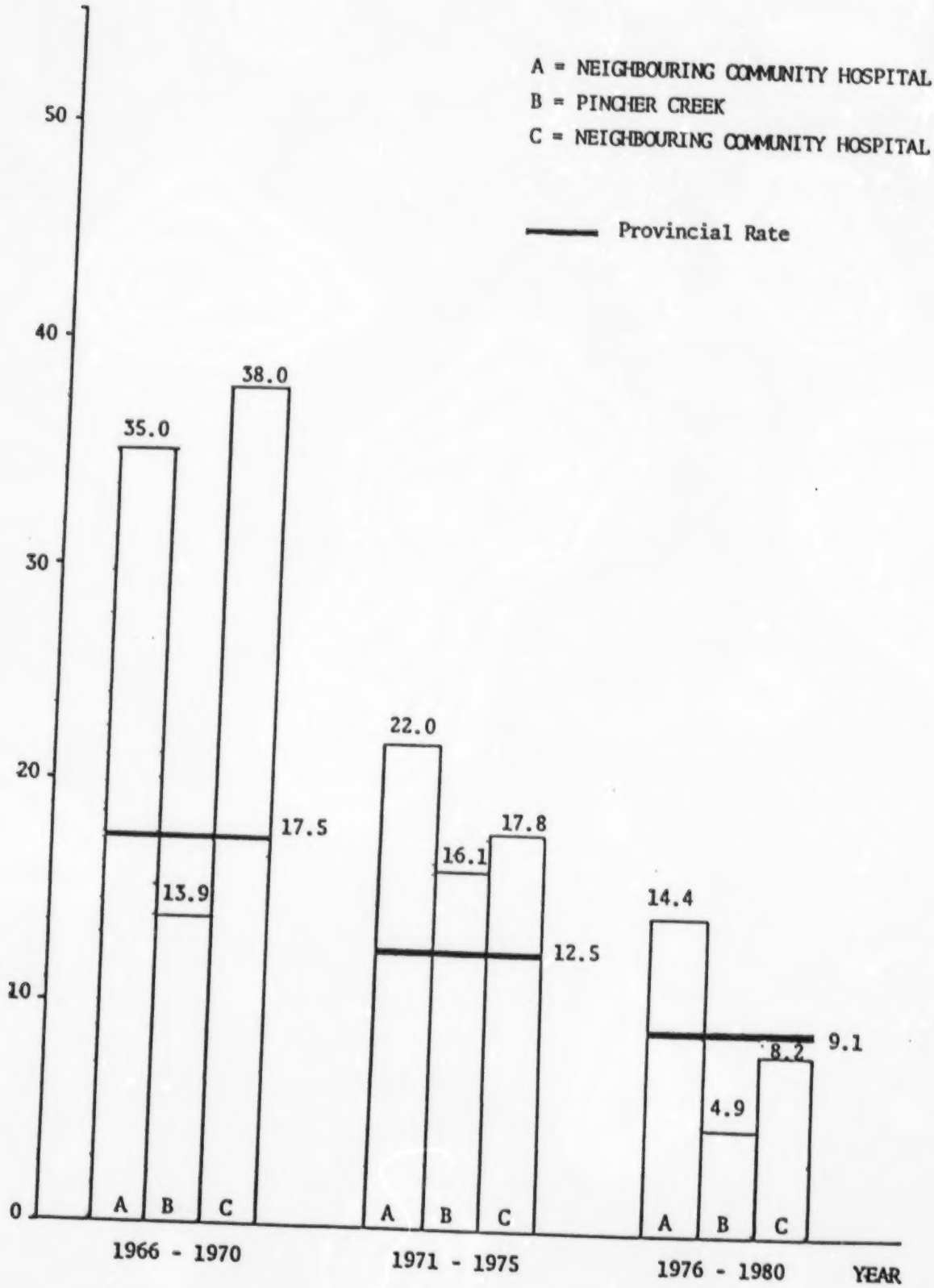
Table 6(c)

Age-specific and standardized death rates from bronchitis
(cause B) 1975-1981 calculated on basis of 1976 population

	Age-specific death rates								crude	standardized
	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70+	death rate	death rate
Bow Island	0.00	0.00	0.00	0.00	0.00	0.00	0.79	11.64	0.92	0.66
Milk River	0.00	0.00	0.00	0.00	0.00	0.00	1.43	0.00	0.13	0.09
Raymond	0.00	0.00	0.00	0.00	0.00	0.71	0.75	4.97	0.63	0.37
Taber	0.25	0.00	0.00	0.00	0.47	0.00	1.35	5.08	0.57	0.44
Cardston	0.21	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.17	0.09
Magrath	0.00	0.00	0.00	0.00	0.00	1.10	2.38	2.12	0.54	0.36
Twin Butte	0.20	0.00	0.22	0.00	0.00	0.00	1.59	2.54	0.34	0.31
Fort MacLeod	0.29	0.00	0.00	0.00	0.00	0.00	3.77	16.67	1.99	1.16
Claresholm	0.00	0.00	0.00	0.00	0.00	0.30	1.52	7.82	1.07	0.53
Vulcan	0.62	0.00	0.00	0.00	0.00	0.71	0.95	4.63	0.78	0.47
High River	0.00	0.00	0.00	0.00	0.00	0.43	0.99	7.60	1.02	0.50
Turner Valley	0.00	0.00	0.00	0.00	0.00	1.30	2.12	0.00	0.39	0.25

APPENDIX 1

PERINATAL DEATH RATES* ≥ 1000 g. 1966-1980



* Rate = $\frac{\text{Perinatal deaths}}{\text{Livebirths + stillbirths}} \times 1000$

PERINATAL DEATHS ≥1000 GRAMS 1966-1980

HOSPITAL	1966		1967		1968		1969		1970		TOTAL		RATE*
	TOTAL BIRTHS	P.D.'s	TOTAL BIRTHS	P.D.'s	TOTAL BIRTHS	P.D.'s	TOTAL BIRTHS	P.D.'s	TOTAL BIRTHS	P.D.'s	TOTAL BIRTHS	P.D.'s	
C	121	7	110	3	112	2	123	4	106	4	572	20	35.0
B	123	1	121	1	127	3	119	3	157	1	647	9	13.9
A	86	5	64	5	55	1	71	1	66	1	342	13	38.0
TOTAL	330	13	295	9	294	6	313	8	329	6	1,561	42	26.9
PROVINCIAL STATISTICS	30,738	575	30,838	554	30,231	493	30,787	541	32,107	549	154,746	2,712	17.5

HOSPITAL	1971		1972		1973		1974		1975		TOTAL		RATE
C	102	2	104	5	112	--	98	1	85	3	501	11	22.0
B	154	4	137	2	142	1	126	2	124	2	683	11	16.1
A	69	3	85	1	99	2	79	--	118	2	450	8	17.8
TOTAL	325	9	326	8	353	3	303	3	327	7	1,634	30	18.4
PROVINCIAL STATISTICS	30,682	480	29,369	425	29,440	358	29,888	311	31,797	318	151,176	1,892	12.5

HOSPITAL	1976		1977		1978		1979		1980		TOTAL		RATE
C	72	1	82	2	103	1	80	2	79	--	416	6	14.4
B	125	2	127	1	102	--	127	--	129	--	610	3	4.9
A	97	1	90	1	99	1	100	1	105	--	491	4	8.2
TOTAL	294	4	299	4	304	2	307	3	313	--	1,517	13	8.6
PROVINCIAL STATISTICS	33,140	352	34,569	331	35,483	305	37,319	301	39,721	354	180,232	1,643	9.1

*RATE = $\frac{\text{PERINATAL DEATHS} \geq 1000 \text{ GMS}}{\text{TOTAL BIRTHS} \geq 1000 \text{ GMS}} \times 1000$

(TOTAL BIRTHS = LIVEBIRTHS + STILLBIRTHS)

CAUSES OF DEATH ≥ 1000 g.

HOSPITAL A	ANOXIA	MALFORMATION	PREMATURITY 1000 GMS	OTHER	TOTAL
1966 - 1970					
MATERNAL CONDITION			1	1	2
PREG. COND.	3			1	4
LABOR FACTOR	2				2
NO FACTOR OR UNCLASSIFIABLE	1	2		2	5
TOTAL	6	2	1	4	13
1971 - 1975					
MATERNAL CONDITION	1				5
PREG: COND.	2			3	5
LABOR FACTOR	1				1
NO FACTOR OR UNCLASSIFIABLE			1		1
TOTAL	4		1	3	8
1976 - 1980					
MATERNAL CONDITION					
PREG: COND.				2	2
LABOR FACTOR	1				1
NO FACTOR OF UNCLASSIFIABLE				1	1
TOTAL	1			3	4

CAUSES OF DEATH ≥ 1000 g.

HOSPITAL B	ANOXIA	MALFORMATION	PREMATURITY 1000 GMS	OTHER	TOTAL
1966 - 1970					
MATERNAL CONDITION					
PREG. COND.	3		3		6
LABOR FACTOR	1				1
NO FACTOR OR UNCLASSIFIABLE				2	2
TOTAL	4		3	2	9
1971 - 1975					
MATERNAL CONDITION	1				1
PREG: COND.	4		2		6
LABOR FACTOR	1				1
NO FACTOR OR UNCLASSIFIABLE		3			3
TOTAL	6	3	2		11
1976 - 1980					
MATERNAL CONDITION					
PREG: COND.	1				1
LABOR FACTOR	2				2
NO FACTOR OF UNCLASSIFIABLE					
TOTAL	3				3

CAUSES OF DEATH ≥ 1000 g.

HOSPITAL C	ANOXIA	MALFORMATION	PREMATURITY 1000 GMS	OTHER	TOTAL
1966 - 1970					
MATERNAL CONDITION				1	1
PREG. COND.	4		1	1	6
LABOR FACTOR	5				5
NO FACTOR OR UNCLASSIFIABLE		5		3	8
TOTAL	9	5	1	5	20
1971 - 1975					
MATERNAL CONDITION					
PREG: COND.		4	1		
LABOR FACTOR	3				
NO FACTOR OR UNCLASSIFIABLE		2		1	
TOTAL	7	2	1	1	11
1976 - 1980					
MATERNAL CONDITION					
PREG: COND.	2			1	3
LABOR FACTOR	1				1
NO FACTOR OF UNCLASSIFIABLE	1			1	2
TOTAL					

BIRTHWEIGHT 500 - 1000 g.

Hospital	1966 - 1970	1971 - 1975	1976 - 1980	Total
A	3	3	0	6
B	2	4	1	7
C	5	1	0	6
	10	8	1	19

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